

RETRIEVAL OF DIGITAL OBJECTS BY REDIRECTION OF CONTROLLED VOCABULARY SEARCHES

Technical Field

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The present invention relates generally to data processing systems and more particularly to the retrieval of digital objects by redirection of controlled vocabulary searches.

10 Background of the Invention

Services for providing digital content may generally be classified into two categories: subscription-based or non-subscription-based. With subscription-based services, the user must first subscribe to the service, which often entails payment of a
15 subscription fee or payment on a per use basis. The content provided by subscription-based services may vary and may include contents such as journal articles, databases, financial information and the like.

Non-subscription-based services do not require that a user have a subscription in
20 order to access information provided by the service. Search engines, such as those provided by Yahoo and Netscape, are examples of non-subscription based services. A user may submit a request to the search engine and receive search results that contain a number of hyperlinks to content available on the Internet without having a subscription.

One current difficulty facing users is that content provided by subscription-based services and content provided by non-subscription based services are distinct and must be queried separately. For example, if a user is interested in information about astronauts, the user must first submit a query to the subscription-based service to obtain search results. Subsequently, the user must submit a separate query to the non-
30 subscription-based service.

Another difficulty concerns hyperlinks within documents. A hyperlink within a document works well so long as the reader of the document has access to the content referenced by the hyperlink. Difficulties may arise where the hyperlink references
35 content that is not accessible to the reader. In many instances, the hyperlink refers purely to content that is freely accessible and, thus, is unduly limiting in its scope.

Summary of the Invention

The present invention provides a mechanism for a hyperlink to be resolved based on user preference to retrieve digital objects. For example, a hyperlink may reference documents regarding Thomas Edison. If the user that clicks on the hyperlink has access to both subscription-based services and non-subscription based services, the user determines which of the services is to be used in resolving the hyperlink to one or more resources. On the other hand, where a user does not subscribe to a subscription-based service, the hyperlink may be resolved by non-subscription-based services when the user clicks on the hyperlink. Thus, in one embodiment, the present invention provides a mechanism for resolving a hyperlink to one or more resources based upon user preference. This enables a hyperlink to be resolved differently based upon whether the user has access to subscription-based services and/or non-subscription-based services.

In one embodiment, the present invention provides a controlled vocabulary that is used to specify a unique variety of hyperlink. The hyperlink contains a uniform resource locator (URL). The URL is not for a service provided to resolve the hyperlink, but rather refers to a hyperlink redirection facility. The hyperlink redirection facility contains information regarding user preferences for resolution services. Alternatively, the hyperlink redirection facility may query the user for preferred resolution service. The hyperlink redirection facility redirects link information and user information to a service provider facility in accordance with user preference. The service provider receives the user information and the link information and directs the information to a service provider that provides resources, such as search results. The resources are then returned to the user by the service provider.

In accordance with one aspect of the present invention, a method is practiced in an environment that has a redirection facility. In accordance with this method, a user requests to access information regarding a semantic value that is associated with a hyperlink. The semantic value is a value that pertains to the meaning of the hyperlink. The semantic value may take different forms, such as a keyword, descriptive term, or identifier, a database key or other value associated with the hyperlink. The request is received at the redirection facility. A user preference is identified regarding which service provider to use to service the request. Based on the user preference, the request is directed from the redirection facility to a service provider for servicing the request.

In accordance with a further aspect of the present invention, user information regarding a user and link information regarding a hyperlink to be resolved to a resource in response to the user selecting the hyperlink are received in an electronic device. A resolution service is identified for employment to resolve the hyperlink based on the user information. At least some of the link information is forwarded to the identified resolution service for resolution of the hyperlink.

In accordance with an additional aspect of the present invention, a request for a resource is received in a computer system. The request originates from a user selecting a hyperlink, and the request is redirected to the computer system by an intermediary. The request is translated into a format that is acceptable to the computer system and the request is serviced by returning a resource to the user.

In accordance with a further aspect of the present invention, a search query is received that originates from a user. Where the user subscribes to a service that provides access only to subscribers, a search is conducted in accordance with a search query on the content that is accessed via the service. The results of the search are returned to the user.

In accordance with a still further aspect of the present invention, a method of advertising is practiced in an environment that has a redirection facility for redirecting a selected request from a requestor for a given resource to a service provider. The selected request is received at the redirection facility. A criterion is examined, and based on the examined criterion, a determination is made whether to present an advertisement to the requestor.

Brief Description of the Drawings

An illustrative embodiment of the present invention will be described below relative to the following drawings.

FIGURE 1 is a block diagram illustrating components and data flow in the illustrative embodiment of the present invention.

FIGURE 2 is a flow chart that provides an overview of the steps performed in the illustrative embodiment.

FIGURE 3 depicts an example of an HTML document used in the illustrative embodiment.

FIGURE 4 illustrates data flow between the user web browser and a hyperlink
5 redirection facility.

FIGURE 5 depicts an example of a request enhancement facility.

FIGURE 6 illustrates the steps that are performed when a service provider does
10 not have any content to provide to a user.

FIGURE 7 is a flow chart illustrating steps that are performed in accordance with an advertisement method of the illustrative embodiment of the present invention.

15 Detailed Description of the Invention

The illustrative embodiment provides a unique approach to resolving hyperlinks. The illustrative embodiment uses three major components in the resolution of hyperlinks. These three major components are a controlled-vocabulary abstract
20 hyperlink, a hyperlink redirection facility and a translation facility for directing a request originating from selection of the hyperlink to a service provider. The controlled vocabulary abstract hyperlink is constructed using a controlled vocabulary and contains a URL that directs a request resulting from the selection of the hyperlink to a hyperlink redirection facility. The hyperlink redirection facility receives the request along with
25 cookies containing information regarding the user and determines where to redirect the request. The hyperlink redirection facility may maintain information regarding user preferences for which services to use in resolving a hyperlink. The hyperlink redirection facility then passes a controlled vocabulary abstract hyperlink to the user for forwarding to a service provider. The controlled vocabulary abstract hyperlink is a structured
30 information request. The service provider receives the controlled vocabulary abstract hyperlink and translates the request into a format suitable for the selected service provider via a translation facility. The service provider then forwards the translated request to the selected service, which returns a resource, such as a web page containing search results to the user.

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The illustrative embodiment exploits both link abstraction and link indirection. The illustrative embodiment exploits link abstraction in that a link refers to an abstract

grouping of resources. For illustrative purposes in the discussion below, it is presumed that the link is for a search. The search can return documents that did not exist at the time that a hyperlink was authored. The illustrative embodiment uses controlled vocabulary link construction such that a particular data object may be assembled in
5 specified ways using formula and algorithms. The illustrative embodiment uses link indirection in that the link initially points to the hyperlink redirection facility and then is redirected to a service provider.

10 In some instances, the service provider to which the hyperlink redirection facility passes the request may not have content to return to the user. In such a case, the illustrative embodiment identifies a next service provider to use and submits the request to the next service provider. This helps to ensure that the user is provided meaningful and useful results from the request.

15 The illustrative embodiment may also entail an advertising method. The
hyperlink redirection facility may determine a number of times that a given user has
requested resources. At periodic intervals, the hyperlink redirection facility may present
an advertisement to the user. Moreover, the advertisement may change depending upon
the number of times the advertisement has been presented to the user. The
20 advertisement may be chosen based on a random criterion, the target service provider,
the date that an advertisement was last sent to the user or other criteria. The
advertisement may be presented to the user by presenting a web page containing the
advertisement. The advertisement may include both video content and audio content.

25 The illustrative embodiment provides a powerful tool for the use of hypertext. A single hyperlink may be resolved in two different fashions for different users. The hyperlink may be resolved to subscription-based services as well as non-subscription-based services. Moreover, the hyperlink may be resolved based on user preference.

30 The illustrative embodiment facilitates change without requiring the modification of a hyperlink. The abstract link contained within a document need not be updated rather the hyperlink redirection facility and service provider may modify the resolution of the link to a concrete link.

Figure 1 depicts a block diagram of components in the illustrative embodiment of the present invention. The information service publisher 10 provides a document 12 that includes a controlled vocabulary abstract hyperlink 14 (“Link” in Figure 1). The

controlled vocabulary abstract hyperlink 14 is the special variety of hyperlink used in the illustrative embodiment. The information service publisher 10 may be any of a number of different publishers that provides digital objects that are accessible via a network, such as the Internet, an intranet, an extranet or other type of network.

5 Although the controlled vocabulary abstract hyperlink 14 is depicted in Figure 1 as being part of a document 12, those skilled in the art will appreciate that more generally, there is just the need for the controlled vocabulary abstract hyperlink 14 to be embedded in some form of content. A user 16 accesses the document and may select the controlled vocabulary abstract hyperlink 14 by directing a mouse cursor to point at the controlled
10 vocabulary abstract hyperlink and clicking a button on the mouse. The user 16 is presumed to have a computer system or other electronic device that allows the user access to the document 12. The user has a connection with a hyperlink redirection facility 22.

15 The hyperlink redirection facility 22 is an intermediary redirection facility that may be implemented in software on a computer system or other electronic device. The device may support the TCP/IP protocol suite and may be part of a network, including but not limited to the Internet, an intranet or an extranet. The hyperlink redirection facility 22 may run on a dedicated server, such as a web server 22. Those skilled in the
20 art will appreciate that multiple hyperlink redirection facilities may be present in a system for practicing the present invention. For example, multiple hyperlink redirection facilities may be operating in parallel. Moreover, multiple hyperlink redirection facilities may be found where a service provider uses such a facility in resolving an abstract hyperlink. Other configurations with multiple hyperlink redirection facilities
25 are also possible. For purposes of simplicity, only a single hyperlink redirection facility 22 is depicted in Figure 1. A service provider 26 serves as the "front end" for receiving requests, translating requests, and passing the request onto services 28. The service provider may be something as simple as a web site. The service provider may run as a facility on a dedicated server. The remaining components depicted in Figure 1, will be
30 described in more detail below relative to discussion of the flow chart of Figure 2.

Figure 2 provides an overview of the steps performed in the illustrative embodiment of the present invention to resolve a hyperlink. Initially, the information service publisher 10 provides a document 12 that contains a controlled vocabulary
35 abstract hyperlink 14 (step 40 in Figure 2). The illustrative embodiment requires that the controlled vocabulary abstract hyperlink 14 be specified in accordance with a schema or controlled vocabulary that describes information items. In order to appreciate

the controlled vocabulary that is employed in the illustrative embodiment, it is helpful to consider an example. Suppose that an Internet publisher imbeds a controlled vocabulary abstract hyperlink 14 which specifies a search for information related to an author names "Wendy Jones." The controlled vocabulary uses the "Genre," "author," and person name "Wendy Jones." The URL contained within the controlled vocabulary abstract hyperlink 14 points to a hyperlink redirection facility. The controlled vocabulary are meta data is used by the hyperlink redirection facility as will be described in more detail below.

10 The information service publisher 10 may, for example, place the document 12
on a web server that is accessible to a user 16 that runs a web browser. The user web
browser displays the document 12 on a display device, such as a video display (step 42 I
Figure 2). The user 16 then selects the controlled vocabulary abstract hyperlink 14 (step
44 in Figure 2). As mentioned above, the user 16 may select the controlled vocabulary
15 abstract hyperlink 14 by positioning a mouse cursor to point at the link within the then
document 12 and then clicking a mouse button. Those skilled in the art will appreciate
that there may be other mechanisms for selecting the controlled vocabulary abstract
hyperlink 14.

A controlled vocabulary abstract hyperlink 14 is then passed to the hyperlink redirection facility 22. This differs from conventional systems in that when a hyperlink is selected in a conventional system, an HTTP request is sent to the designated URL for resolution. The controlled vocabulary abstract hyperlink 14 contains meta data and a URL that points to the hyperlink redirection facility 22. Figure 3 depicts an example hypertext markup language (HTML) document that contains a controlled vocabulary abstract hyperlink 14. The document 12 contains the typical tags found in an HTML document, including a <HTML> tag pair, a <head> tag pair, a <title> tag pair and a <body> tag pair. The controlled vocabulary abstract hyperlink 14 is specified as shown on lines 60 and 62 as a hyperlink that contains a URL for the hyperlink redirection facility 22. For the example depicted in Figure 3, it is presumed that the controlled vocabulary abstract hyperlink is for a portion of hypertext that identifies a stock ticker symbol "RHAT".

One or more cookies 20 are sent from the user web browser (see 16 in Figure 1) to the hyperlink redirection facility 22 (step 48 in Figure 2). The cookies are data structures that hold context information. In the present context, the term “cookie” refers to a structure as defined in the cookie specification developed by the HTTP working

Group of the Internet Engineering Task Force (IETF) in RFC 2109. The cookies 20 may contain user information and link information. The user information may include information regarding the user and the user preferences regarding resolution services to use in resolving the controlled vocabulary abstract hyperlink 14. The cookies 20 may also contain information regarding the number of times that the user has submitted a request to the hyperlink redirection facility 22. The user 16 has submitted a request to the hyperlink redirection facility 22. Figure 4 shows an example. The user web browser 64 sends a first cookie 66 that identifies that the user would like to use Netscape NetCenter to resolve the controlled vocabulary abstract hyperlink 14. Resolution entails providing resources in response to a request to get resources at a specified URL. The user web browser 64 also sends a second cookie 68 that contains information regarding the number of times that the user has submitted a request to the hyperlink redirection facility 22. In the example depicted in Figure 4, the user has submitted seven requests to the hyperlink redirection facility 22. As will be described in more detail below, the information regarding the number of times the user has submitted requests to the hyperlink redirection facility 22 may be used to guide handling of the controlled vocabulary abstract hyperlink 14 and to determine whether to provide advertising to the user.

The hyperlink redirection facility 22 identifies a resolution service to use in servicing the requests associated with the controlled vocabulary abstract hyperlink 14 (step 50 in Figure 2). The resolution service may be identified within the cookies, such as cookie 66 in Figure 4 or may be identified in a database 24 that contains information regarding user preferences. The user preferences may be prioritized or may contain multiple resolution services in some instances.

The hyperlink redirection facility 22 then redirects the URL (see 70 in Figure 4) for the appropriate resolution service or services to the identified resolution service or services (step 52 in Figure 2). As shown in Figure 1, the URL 70 is passed back to the user web browser. Figure 4 shows an example wherein a URL is returned for submitting a stock ticker quote request for RHAT from the Netscape NetCenter service.

The user web browser sends the controlled vocabulary abstract hyperlink 14 to the resolution service, i.e. the service provider 26 (step 54 in Figure 2). The service provider 26 provides a framework in which a service, such as a library, can make information services available to customers based on links to information items. The service provider 26 receives a structured information request in the form of a controlled

vocabulary abstract hyperlink 14 and responds with requested information. The response may take many forms and may take the form of URL 30 as shown in Figure 1. The service provider 26 uses templates to construct the URL that is passed back to the user browser. The URL strings are formed by filling in blanks in templates. For example, consider a journal article with a web site at <http://www.publisher.com/>. This journal has articles that have URLs based on volume and page such as shown in Table 1.

Volume	Start Page	URL
3	25	http://www.publisher.com/003/25/
10	485	http://www.publisher.com/010/485/

The template is as follows.

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<?xml version="1.0">
<!DOCTYPE S-Link-S SYSTEM "S-Link-S.dtd">
<S-Link-S ID="example">
<URL>http://www.publisher.com/<pad padChar="0" length="3">&volume;</pad>/&startpage;</URL>
</S-Link-S>
```

For the example template document, "&startPage;" and "&volume;" are placeholders or blanks for the starting page number and the volume number, respectively. These placeholders are filled in with actual values to create a URL. The "<pad>" tag indicates that padding 0's need to be added to make fixed-length strings. The service provider 26 has templates available and uses the meta data passed from the controlled vocabulary abstract hyperlink 14 to construct the URL that is returned.

In some instances it may be useful to add additional information to the controlled vocabulary abstract hyperlink 14 so as to enhance the results that are returned by a service provider 26. A request enhancement facility 90 (Figure 5) serves the function of embellishing the controlled vocabulary abstract hyperlinks. As shown in the example in Figure 6, the request enhancement facility 90 may add information from the user cookie 92, another controlled vocabulary abstract hyperlink 94, source Material 96 or knowledge databases 98 for inclusion in the controlled vocabulary abstract hyperlink 14. One example of the use of a request enhancement facility 90 is the inclusion of ISSN numbers. Although an ISSN number is not particularly interesting to a user, a ISSN number may greatly enhance the nature of a query that is submitted.

In the above-described fashion, the resolution service resolves the controlled vocabulary abstract hyperlink (step 56 in Figure 2). For the example set forth above

where a URL is returned for submitting a stock ticker quote request from a service, the service provider has a template for the stock symbol request from Netscape NetCenter is <http://lookup.netscape.com/lookup/Lookup.tibco?search=<symbol>&d=quote&type=0>. The tag <symbol> in the template is replaced with RHAT by the resolution service to produce the URL that is returned to the user. The service provider 26 then returns a URL or other content with resolution objects to the user 16 (step 58 in Figure 2).

The controlled vocabulary abstract hyperlink 14 may serve as a type of genre selector. The "genre" refers to the kind of content being retrieved (e.g. journal articles, database records, books, etc.). For example, an ISBN value and a ticker symbol value may get resolved using a different set of preferences as they represent two different genres. The stock ticker symbol may be resolved by a financial service publisher and the ISBN value may be resolved by a technical journal publisher. Different preferences may be associated with the use of the respective service providers.

As was mentioned above, in some instances, the resolution service to which the controlled vocabulary abstract hyperlink 14 is passed may not provide content or may not have any content that satisfies the request encapsulated in the controlled vocabulary abstract hyperlink 14. The illustrative embodiment provides a mechanism for a second chance for resolving a controlled vocabulary abstract hyperlink 14. Figure 6 is a flow chart illustrating the steps that are performed in such an instance. Initially, the first service has no content to return to the user 16 (step 130 in Figure 6). The controlled vocabulary abstract hyperlink 14 is then returned to the hyperlink redirection facility 22 along with information to identify the service provider that failed to resolve the hyperlink (step 132 in Figure 6). The hyperlink redirection facility 22 then identifies the next service to utilize (step 134 in Figure 6). The controlled vocabulary abstract hyperlink is sent to the next service provider (step 136 in Figure 6), and the next service provider services the request (step 138 in Figure 6). Those skilled in the art will appreciate that such iterations may go more than two levels deep such that if the second service provider fails, a third service provider is used and if the third service provider fails a fourth service provider is used, and so on.

The illustrative embodiment also provides a mechanism for performing advertisement. Figure 7 is a flow chart illustrating the steps that are performed in accordance with this method. Initially, the cookie 68 identifying the number of requests that have been services by the hyperlink redirection facility for the user is received by the hyperlink redirection facility (step 140 in Figure 8). The hyperlink redirection

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facility 22 extracts this information from the cookie to determine the number of requests that have been submitted by the user (step 142 in Figure 8). The hyperlink redirection facility 22 may use a number of different criteria to determine whether to send an advertisement and if so, what advertisement to send. The hyperlink redirection facility

5 22 may examine the number of times the user has used the hyperlink redirection facility, when the user last used the hyperlink redirection facility, the identity of the targeted service, random criteria or other criteria. The hyperlink redirection facility 22 makes a determination whether to present an advertisement to the user based on the examined criteria (step 144 in Figure 8). Where a decision is made to send the advertisement, the

10 appropriate information is sent to the user (step 146 in Figure 8). The sending of the advertisement may entail sending a web page that contains an advertisement to the user. The advertisement may include both audio and video content. The criteria may also be used to determine which of multiple advertising choices are sent to the user.

15 While the present invention has been described with reference to an illustrative embodiment thereof, those skilled in the art will appreciate that various changes in form and detail may be made without departing from the intended scope of the present invention as defined in the appended claims.

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